Maryland School Assessment

Science

2007 Public Release

Grade 5

Acknowledgements:

Amusement Park Physics: Free Fall

"Free Fall" from *Amusement Park Physics* at **www.learner.org,** Annenberg Media, ©1997.

Greenhouse Effect

"The Greenhouse Effect." Courtesy: United States Environmental Protection Agency.

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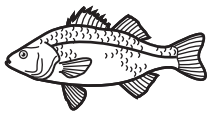
Session 1

1 **Fossils are the evidence of organisms that lived long ago.**

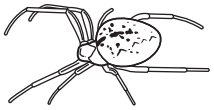
Which of these animals would most likely form a fossil?

○ **A**



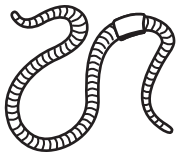
Fish

○ **B**



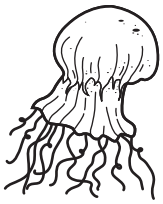
Spider

○ **C**



Earthworm

○ **D**



Sea Nettle

2 **A student mixed 25 grams of salt into 1,000 grams of water.**

What is the mass of the saltwater mixture?

○ **A** 975 grams

○ **B** 1,000 grams

○ **C** 1,025 grams

○ **D** 2,500 grams

3 **A teacher told four students to each measure the mass of a closed container of water. The students took turns measuring the mass. Their data are shown in the table below.**

MASS OF CONTAINER

Student	Closed Container of Water (grams)
1	100
2	99
3	98
4	102

Which statement best explains why there are four different measurements?

- ○ **A** The balance was new.
- ○ **B** Each measurement was done at a different time.
- ○ **C** Each student used a different process to find mass.
- ○ **D** Movement caused the container to lose or gain mass.

4 **Natural processes shape the surface of Earth.**

Most canyons are formed by

- ○ **A** ice
- ○ **B** plants
- ○ **C** steady winds
- ○ **D** moving water

Directions

Use the passage below to answer Numbers 5 through 7.

Free Fall

Galileo first introduced the concept of free fall. His classic experiments led to the finding that all objects free fall at the same rate, regardless of their mass. According to legend, Galileo dropped balls of different mass from the Leaning Tower of Pisa to help support his ideas.

A freely falling body is an object that is moving under the influence of gravity only. These objects have a downward acceleration toward the center of the earth. Newton later took Galileo's ideas about mechanics and formalized them into his laws of motion.

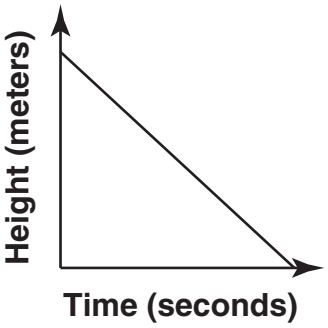
Free-fall rides are really made up of three distinct parts: the ride to the top, the momentary suspension, and the downward plunge. In the first part of the ride, force is applied to the car to lift it to the top of the free-fall tower. The amount of force that must be applied depends on the mass of the car and its passengers. The force is applied by motors, and there is a built-in safety allowance for variations in the mass of the riders.

After a brief period in which the riders are suspended in the air, the car suddenly drops and begins to accelerate toward the ground under the influence of the earth's gravity. The plunge seems dramatic. Just as Galileo and Newton explain in their theories of free fall, the least massive and most massive riders fall to the earth with the same rate of acceleration. If the riders were allowed to hit the earth at that speed, coming to a sudden stop at the end of the ride, there would certainly be serious injuries. Ride designers account for this by building an exit track. The car is attached to this track, which gradually curves toward the ground. A stretch of straight track allows the car to slow down and brake, producing a controlled stop at the bottom, that keeps passengers from getting injured.

5 **Which graph <u>best</u> shows the motion of a car in a free-fall ride as the car drops?**

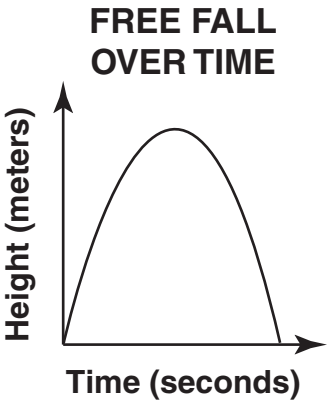
○ **A**

○ **B**



○ **C**

○ **D**



6 **The seats in a car of a free-fall ride are replaced with heavier seats.**

This change requires

- ○ **A** more force to lift the car
- ○ **B** less time to stop the car
- ○ **C** a lower rate of speed
- ○ **D** a higher rate of speed

7 **Two different-shaped objects were dropped from the same height. Data from the investigation was recorded, as shown below.**

Object Shape	Mass (grams)	Height Dropped (meters)	Average Time to Fall (seconds)
Round	100	10	10
Rectangular	115	10	12.5

Explain why the average times to fall were different for the two objects. In your explanation, be sure to include

- **the errors in this investigation**
- **how these errors affected the outcome**
- **how the investigation should be improved to obtain valid data**

Write your answer in the space provided.

8 **Mixing sugar, water, and lemon juice makes lemonade.**

Material	Characteristic Before Mixing	Characteristic After Mixing
Sugar	White crystal	Not visible
Water	Clear liquid	Slightly cloudy liquid
Lemon juice	Cloudy liquid, not very sweet	Cloudy liquid, sweet

Which of the following statements best describes the properties of the materials after mixing the lemonade?

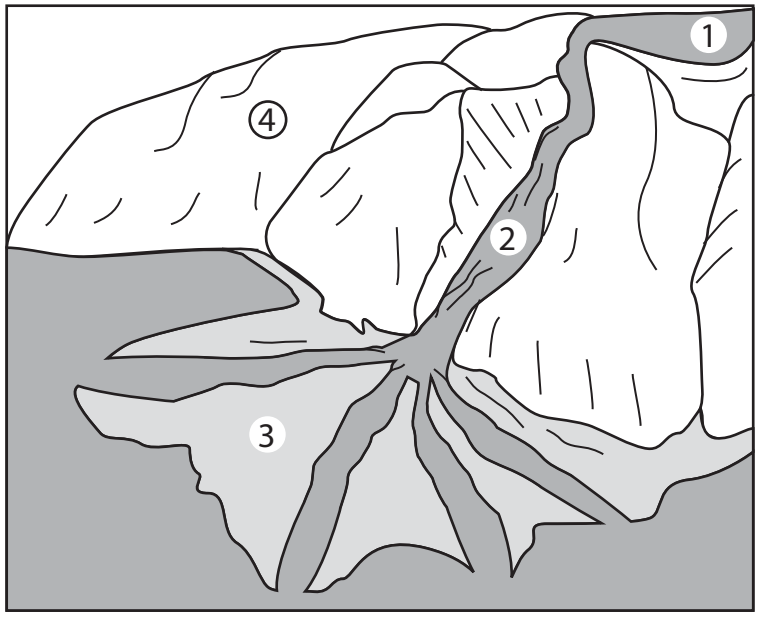
- ○ **A** The materials develop all new properties.
- ○ **B** The materials kept all of their original properties.
- ○ **C** The materials kept many of their physical properties.
- ○ **D** The materials changed most of their physical properties.

9 **A student boils 100 grams of water to form water vapor (gas).**

What method should the student use to determine that the mass of the water vapor is equal to 100 grams?

- ○ **A** measuring the amount of water vapor (gas) in the air
- ○ **B** collecting the water vapor (gas) and cooling it back to a liquid
- ○ **C** weighing the beaker before and after the water is boiled
- ○ **D** comparing the temperature of the boiling water to the temperature of the water vapor (gas)

10 **Erosion, transportation, and deposition change the surface of Earth.**



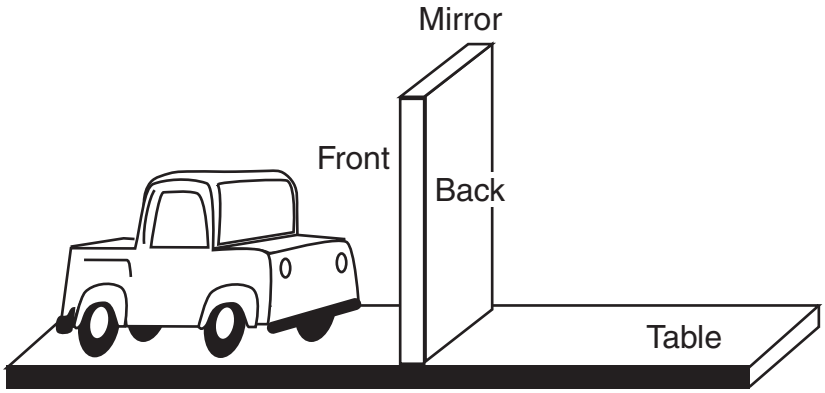
Which number in the diagram represents a landform made by the deposition of eroded sediment?

- **A** 1
- **B** 2
- **C** 3
- **D** 4

Directions

Use the information below to answer Numbers 11 through 13.

INVESTIGATING A PLANE MIRROR



Several students placed a toy truck on a table in front of a plane mirror and viewed the image of the truck in the mirror. Next, the students moved the toy truck to different positions and observed the reflected images of the truck from each position.

11 **The students placed the toy truck 20 centimeters in front of the mirror.**

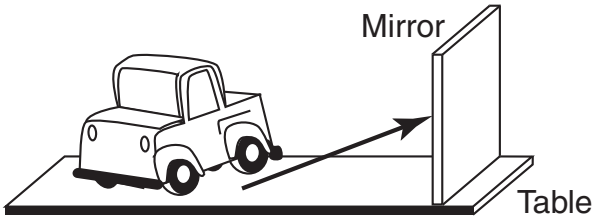
The image of the truck will appear to be

- ○ **A** 0 centimeters from the mirror
- ○ **B** 10 centimeters in front of the mirror
- ○ **C** 20 centimeters behind the mirror
- ○ **D** 40 centimeters behind the mirror

12 **How does the size of the image of the toy truck compare to the size of the actual toy truck?**

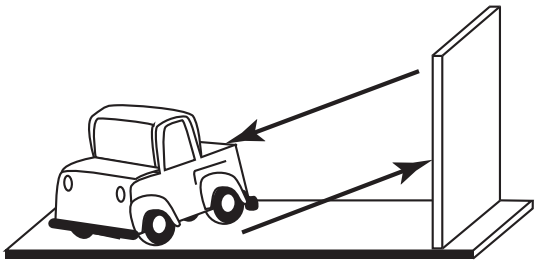
- ○ **A** the image is larger than the actual truck
- ○ **B** the image is smaller than the actual truck
- ○ **C** the image is the same size as the actual truck
- ○ **D** the image size depends on the light behind the toy truck

13 **The diagram below shows the path of a light ray from the toy truck to the mirror.**

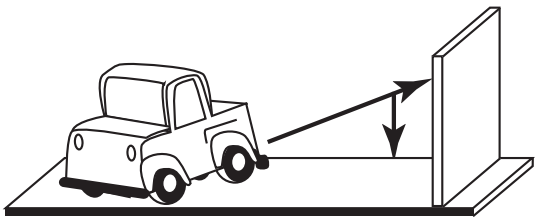


Which diagram best shows the path of the light ray after it is reflected from the mirror?

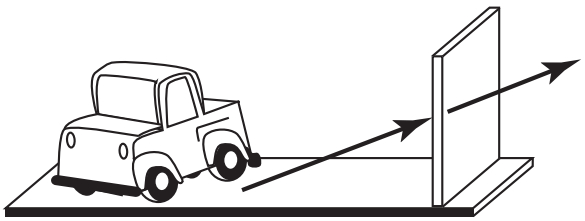
○ **A**



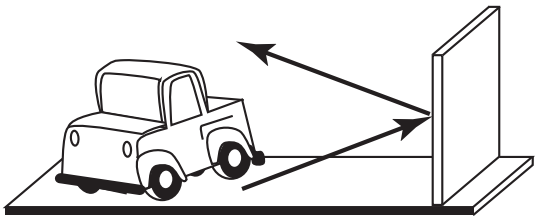
○ **B**



○ **C**



○ **D**



14 **In 1933, a hurricane came ashore at Ocean City, Maryland.**

A hurricane negatively affects a coastline by

- ○ **A** causing erosion
- ○ **B** causing earthquakes
- ○ **C** increasing food production
- ○ **D** increasing the growth of grasses

15 **How do coal and the sun compare as sources of energy?**

- ○ **A** Coal is renewable, and the sun is renewable.
- ○ **B** Coal is renewable, and the sun is nonrenewable.
- ○ **C** Coal is nonrenewable, and the sun is renewable.
- ○ **D** Coal is nonrenewable, and the sun is nonrenewable.

16 **Trees are a renewable natural resource.**

Which of these industries has the least need for trees?

- ○ **A** automobile manufacturing
- ○ **B** home building
- ○ **C** landscaping
- ○ **D** newspaper

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